3. That the child shall come to the table in a proper mental attitude, e. g., free from fatigue.

4. That the child shall remain at the table uninterrupted for thirty minutes.

5. That no mention of food be made during or between meals.

242 Moss Avenue.

DISCUSSION

C. F. GELSTON, M. D. (384 Post Street, San Francisco).—To say that 90 per cent of children beyond the first year have faulty eating habits sounds exaggerated, but is unquestionably only too true. Certainly, it would seem that as physicians we should seriously take cognizance of this problem and use our influence with parents, teachers, nurses, all those coming in contact with the child, to prevent, by education, such an appalling situation. It would actually appear that there is more unhappiness, more disruption of family placidity and routine by this bad habit than by any one other complaint.

As is pointed out, training must be begun early, at the first sign of this nervous anorexia. As a rule this becomes noticeable in the second year, although frequently enough at the end of the first. Much can be gained if we are only able to impress upon the parents the importance of winning these first "battles of wills." The saving in peace of mind later is incalculable. Without realization, one so easily slips into the habit of diverting the child's attention while, as Doctor Stafford literally expresses it, food is "poked" down the youngster's throat. From this point is a short step to a "vaudeville show" at every meal with a steadily increasing irritability, nervousness and unhappiness of the mother, all of which the child thoroughly enjoys. And to have this repeated three times a day is bliss itself.

We have a practical application of discipline, as practiced by many mothers of several children. Such a mother is not infrequently constantly busy from morning till night. She simply has not the time or nervous energy to spend in pampering the whims of her offspring. Food is prepared for all of them, they are seated at table, and they eat or do not eat as they see fit. The first-born may attempt for a long time to receive special attention but, sooner or later, his overworked mother gives him the needed discipline, and the child, once convinced that the game is lost for him, "falls to." If only mothers of but one child would be as sensible.

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WILLIAM W. BELFORD, M. D. (611 Medico-Dental Building, San Diego).—Doctor Stafford deserves our thanks for this timely paper, for the child that does not eat is fast becoming one of our major problems. By far the larger group of these children fall into the third class Doctor Stafford describes as psychological maladjustment. My remarks are directed toward the prevention of this problem.

There are many ways of approaching the problems these children and their parents present. The prevention is relatively easy if we but remember to educate and direct the parents as to what is to be expected in regard to food habits and growth. In the first six months we have learned that many artificially fed children can grow and develop satisfactorily with three feedings in the twenty-four hours. Some children begin as early as ten or eleven weeks of age to take eight ounces of a moderately concentrated feeding three times a day. This satisfies their hunger and allows a generous interval between for digestion. In other words they eat when hungry. When additional foods are added at six, seven and eight months it is seldom necessary to return to four feedings a day for by proper adjustment plenty may be given with each meal. No between-meal feedings are needed or allowed. At varying intervals more foods are added, but at no time is the parent or nurse allowed to force or override the child's dislike. The child eats because he is hungry and never to please the adult. The young mother who starts out on the line of no forcing, has a child who eats because he satisfies his appetite and hunger and never to please the adult feeding him or preparing his food. This mother seldom turns up with the child who will not eat.

In the first twelve months the baby gains fast, some ten to eighteen pounds. After fourteen months, though, this gain stops and for the next four or five years the gain will average about four pounds a year. Some in the second ten or twelve months may gain only a pound or two and be quite happy and contented and growing steadily and satisfactorily. The parents are told of this, reassured, told again and again and before the period of stationary weight or slow gain comes on. Few are worried when they understand something of the phenomenon called growth.

I wish it had been possible for Doctor Stafford to go into more detail about the methods he uses. So many of these children, and their parents, with bad food habits have to be cajoled and warped into new ways and thoughts by all sorts of reasoning. I disagree with Doctor Stafford that children under six years should not be permitted to eat with their parents. The child over two years who eats because he has an appetite and hunger for food is not often upset in satisfying his needs by the ordinary family conversation. Children get tired being constantly with the nurse or their mother at mealtimes, and graduation to the adult table is often all that is needed to correct considerable unhappiness.

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DOCTOR STAFFORD (Closing).—It is good to know Doctor Gelston and Doctor Belford feel so keenly about "the child who will not eat."

All scientific progress calls forth new problems. Our advancing knowledge of nutrition is no exception for anorexia in children is certainly an outgrowth of our increased understanding of food. Pediatricians will, of course, vary in their methods of dealing with children who refuse to eat properly, but only when parents and nurses recognize a happy balance between proper food and the child's psychological attitude toward mealtime will the full benefits of our increased knowledge be manifest.

BLOOD SEDIMENTATION TEST*

ITS SIGNIFICANCE IN GYNECOLOGY

REPORT OF CASES

By DONALD G. TOLLEFSON, M. D.
Los Angeles

DISCUSSION *by Donovan Johnson, M. D., Los Angeles; Alice F. Maxwell, M. D., San Francisco.*

ACCORDING to Baer and Reis the phenomenon of the sedimentation test dates back to the *Crusta Phlogista* of the ancients, which was first described by Galen. It was noted that blood from patients suffering from inflammatory disease, when allowed to stand, would separate out into two portions—one serum, and one erythrocytes. The various theories have been so completely discussed in the literature that they are purposely omitted here. Probably the first individual to use this procedure in gynecologic diagnosis was Lizenmeier, and his technique, as modified by Friedlaender, is the one herein described.

The material for this analysis is based on some two thousand readings on eight hundred and fifty patients admitted to the obstetric and gyneco-

* Read before the Los Angeles County Medical Association, February 7, 1929.

logic service of the Long Island College Hospital in Brooklyn, New York. Part of the material here considered has previously been reported in a paper presented at the 1927 session of the American Medical Association by Polak and Tollefson.

When correlated with physical findings and other laboratory data the sedimentation test is of definite value in diagnosis. A rapid rate means infection, and a slow rate excludes this possibility.

Technic.—Draw 0.2 of a cubic centimeter of 5 per cent sodium citrate into a 1 cubic centimeter graduated tuberculin syringe. With a small hypodermic needle attached, draw 0.8 of a cubic centimeter of blood from one of the small veins in the arm, thus making 1 cubic centimeter of a solution of citrated blood, which is placed in a standard calibrated tube. Shake thoroughly by inverting the tube and take the time. When the erythrocytes have settled to the 18 millimeter mark, leaving the clear serum above, take the time again. The difference in minutes is the sedimentation time. The best period in which to perform the test is about three hours after the last meal.

INTERPRETATION OF THE TEST

We have taken 120 minutes as the sedimentation rate for the normal individual. Whenever a rapid sedimentation time is noted the reading is taken to indicate an infection.

Pregnancy.—However, Fahreus in 1917 called attention to the variation in the sedimentation time of patients who were pregnant. Like his results, our series show that, after the third or fourth month, the rate becomes lower than normal. Table 1 illustrates the reading in the pregnancy group. In postpartum cases it is of some value. Whenever the sedimentation rate continued to decrease or remain below ten minutes the chances for recovery from postpartum infection were extremely small.

Carcinoma.—Carcinoma patients give a rapid sedimentation time whenever infection is present. Frommelt and Motiloff [5] believe that an increased rate might be used as a means of determining a recurrence of the malignant growth. We believe that the rapid rate is due to infection occurring in the tumor tissue. Table 2 illustrates the readings in the more common locations of malignancy. The rapid rate in papillary cyst is probably due to the low-grade peritonitis excited by rupture of the malignant process.

After Operation.—There is a definite increase in the rate of settling, following operation, as is shown by fifty cases, where the test was repeated at frequent intervals in order to obtain an estimate of its value. We note that following operations there is a rapid drop with the first three or four days. If the convalescence is proceeding normally the rate gradually ascends; if infection is present, the rapid rate continues until this is eliminated. The postoperative drop in the rate of settling is probably due to absorption and the changes incident to anesthesia and tissue destruction.

Anemia. — Secondary anemia, according to Cherry,[6] causes a slower sedimentation time, while in our experience, where no infection is present, there is no change.

Average Readings.—Having allowed for certain conditions which cause an error in appreciating the significance of the test, we find that in typical pathologic conditions certain average readings, which, when compared with other observers, agree almost identically. In Table 3 a few of the more common rates are charted. Whenever the sedimentation time is below thirty minutes, accumulation of purulent material, either as a circumscribed abscess, or multiple minute foci, will be a constant finding. In active tubal infections with leukocytosis and elevation of temperature, the rate of sedimentation averages thirty-eight minutes. Where this type of infection has been present but not active, the readings vary between ninety and two hundred minutes. Parametritis averages thirty-six minutes, while the long-standing process, which is clinically inactive, averages one hundred and thirty-six minutes.

As an aid in diagnosis two cases will show its value.

REPORT OF CASES

Case 1.—Patient 2472, admitted to the hospital with a diagnosis of infected ovarian cyst, showed a sedimentation time of nineteen minutes. At operation, in addition to adenoma-carcinoma of the uterus with metastasis, a subsiding acute appendix was also discovered.

* * *

Case 2.—Patient 3462, with a sedimentation time of twenty-seven minutes and a normal blood count, was admitted for postoperative hernia and a tumor mass in the right lower quadrant. On exploration of the abdomen a parametrial abscess was discovered. In another case the admission diagnosis was fibroid with degeneration. The patient had a normal blood count, but a sedimentation time of fifteen minutes. The operation was postponed. Patient developed a temperature and ten days later a pelvic abscess was drained per vagina. Rapid sedimentation spells infection. If not in pelvis, other parts of the body may harbor the focus.

VALUE OF TEST IN ECTOPIC PREGNANCY AND SALPINGITIS

If sedimentation is an index of the presence of infection its use might be indicated in the differential diagnosis of ectopic pregnancy. It is a well-known fact that the leukocyte count varies markedly, even when taken at frequent intervals. Following intraperitoneal hemorrhages, there is a marked leukocytosis; but if the bleeding stops the count will approach normal within a few hours. The temperature is also of no value in diagnosing ectopic pregnancies. Comparative readings show that the rate in extra-uterine pregnancy is slow, while that of salpingitis is rapid (Table 4).

In ten ectopic pregnancies reported by Polak and Mazzola [7] the average sedimentation rate was 105 minutes, while in fifteen of this series the average reading was 115 minutes. The more ad-

vanced the pregnancy the more rapid the rate, as Table 5 indicates. The intact ectopic pregnancies or those with a slight rupture, if seen early, will show a reading of around 100 minutes, while the old cases, where the symptoms have been of two weeks' or more duration, give the rapid readings of an infection. Apparently old hematomas excite a low-grade peritonitis. Here the test is of little significance, but when the typical symptoms of either condition are present and the onset is of recent date a slow rate is indicative of an ectopic pregnancy, while a rapid rate suggests tubal infection.

Two cases will illustrate this point.

CASE 3.—Patient 2724, with a typical history of a postponed menstrual period and physical findings suggestive of ectopic pregnancy, had a leukocyte count of 33,400, but the sedimentation time was only seventy-two minutes. The following day it had dropped to forty-five minutes, but the findings were so typical that laparotomy was done and an acute salpingitis was discovered.

* * *

CASE 4.—Patient 6336. The history and pelvic findings were again typical of an extra-uterine pregnancy, but the sedimentation time was thirty-five minutes. At operation an acute salpingitis was found. Therefore, by exclusion of infection, the sedimentation test may add confirmatory evidence in the diagnosis of early ectopic pregnancy.

A SAFEGUARD IN ELECTIVE PROCEDURES

In gynecology at least 90 per cent of the operations are elective, and when one considers the danger of an ordinary laparotomy in the hands of the most careful operator he is at once impressed with the danger, when seemingly simple fibroid tumors are complicated by clinically inactive but quiescent infection. When leukocytosis and elevation of temperature are present we know that infection exists; but in those cases where the blood count and the physical findings suggest no complication the sedimentation time is an index of the presence and severity of the infection.

Following our previous report, we formulated the rule that patients should not be subjected to laparotomy if the sedimentation time was under ninety minutes. We believed that when operation was performed on such patients the convalescence would be prolonged, troublesome complication might arise and the end-result would be unsatisfactory. We have performed operations in these cases, and they have been of value in proving our conclusion in this work.

In benign tumors the readings are normal (see Table 6), but coexisting infection increases the speed of sedimentation. The judgment of when to operate is probably more important than how to perform the procedure.

CASE 5.—Patient, Mrs. N., was admitted to hospital with a diagnosis of tubo-ovarian disease, with a normal blood count and normal temperature, but a sedimentation time of thirty-two minutes. A hysterectomy was performed, and a stormy convalescence followed. She was discharged on the twenty-second postoperative day against advice, with a sedimentation time of twenty-eight minutes and a marked pelvic exudate. She was seen in the clinic two months later and her general condition was extremely poor.

CASE 6.—Patient, Mrs. S., with a sedimentation time of forty-five minutes, normal blood count and normal temperature, had a hysterectomy for fibroids. Her postoperative course was extremely unsatisfactory; she developed a wound infection which kept her in the hospital for thirty-eight days.

* * *

CASE 7.—Patient 7107, had a pelvic abscess in 1925. Admitted to hospital in 1928 because of pelvic pain and fibroid tumor. The blood count and temperature were normal and the sedimentation rate was 240 minutes. The danger of lighting up an old focus was eliminated.

* * *

CASE 8.—Patient 6100, normal blood count and normal temperature, had a sedimentation time of twenty-seven minutes. Hysterectomy was performed. A stormy convalescence followed.

* * *

CASE 9.—Patient 8995, with a diagnosis of fibroids, showed a normal blood count and sedimentation time of forty minutes. Patient died thirty-one hours after operation. Diagnosis at death was given as toxemia and cardiac failure. Possibly the rapid rise in temperature, pulse rate and respiratory rate, indicated the presence of some infection which we did not discover.

TABLE SHOWING SEDIMENTATION TIME IN VARIOUS CONDITIONS

TABLE 1.—*Pregnancy*

No. of cases	Diagnosis	S. T.
33	Normal pregnancy	110 min.
25	Postpartum, normal	52
27	Postpartum, febrile	20
20	Abortion, 2-3 months	68
15	Abortion, febrile	30

TABLE 2.—*Malignancy*

No. of cases	Location	S. T.
11	Cervix	31 min.
8	Ovary	85
5	Breast	52
10	Uterus	80
3	Papillary cyst adenoma	23

TABLE 3.—*Infection*

No. of cases	Diagnosis	S. T.
18	Pelvic abscess	16 min.
22	Breast abscess	23
31	Salpingo-oophoritis, active	38
16	Salpingo-oophoritis, inactive	130
25	Pelvic infection, active	36
31	Pelvic infection, inactive	136

TABLE 4.—*Ectopic Gestation versus Salpingitis*

No. of cases	Diagnosis	S. T.
10	Ectopic (Polak and Mazzola)	105 min.
15	Ectopic (Recent)	115
31	Salpingo-oophoritis, active	38
25	Pelvic infections, active	36

TABLE 5.—*Ectopic Gestation*

No. of cases	From onset	Remarks	S. T.
1	1 day	Free blood	170 min.
2	8 hours	Faint, immediate operation	167
3	1 day	Some free blood	138
4	2 days	Fimbriated end	113
5	2 days	Boldt's sign	102
6	7 days	No sharp pain	92
7	6 days	Free blood	90
8	?	Tubal abortion	89
9	2 weeks	Rubin Test 3 months	74
10	12 days	Old P. I. D.	57
11	4 weeks	Peritoneal exudate	27
12	5 weeks	Hematoma, not removed	14

TABLE 6.—*Benign Tumors*

No. of cases	Diagnosis	Average S. T.
13	Ovarian cysts	180 min.
21	Fibroids	175
37	Fibroids and infection	65
3	Fibroids and necrosis	47

CONCLUSIONS

1. While Schmitz, reporting on eighty patients, and Cherry, reporting on seventy-one patients, state that the test is of no value, most writers believe it has its place in laboratory diagnosis when the blood count, temperature, and physical findings are correlated with it.

2. Rapid rates indicate infection. Slow readings exclude this possibility of infection, regardless of leukocytosis and elevation of temperature.

3. It also is suggested that it might be of use as a prerequisite in the Rubin test, insertion of radium in benign conditions and in diagnostic curettage.

4. As it is a simple procedure, its routine use seems justifiable because it may be a means of excluding the latent or quiescent infection, when an elective operation is under consideration, and thereby prevent prolonged convalescence, morbidity, and mortality.

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DISCUSSION

DONOVAN JOHNSON, M. D. (1930 Wilshire Boulevard, Los Angeles).—Doctor Tollefson's paper gives an accurate description of the sedimentation test as it is performed in the majority of clinics in this country. The small glass test tubes in place of the long capillary tubes first used and the standardized readings at the 18 millimeter mark simplify the procedure greatly. It is a test that anyone can use, whether experienced in laboratory work or not, and for this reason I believe it should be given a more extended trial. It will be only as we use this sedimentation test that personal conclusions can be drawn as to its value. We have listened to Doctor Reuben Peterson's hearty recommendation of the test this evening and, with the knowledge that others are finding it a distinct advantage in the diagnosis and prognosis of disease, I feel certain it will not be long until it is in general use.

While my experience with the test in gynecologic cases has been somewhat limited, I can say I have given it a good trial in obstetric patients. During the past year, at the Chicago Lying-In Hospital, it was used repeatedly in pathologic cases where the diagnosis was in doubt or where some light might be thrown on the prognosis of a given case. As has been brought out by others, the greatest value of the test is its capacity to show the severity of an infection. It is also valuable as being one of the most delicate tests in picking up an early infection. The importance of repeated examinations at frequent intervals cannot be overemphasized.

The value of the sedimentation test in obstetrics is somewhat limited, as compared to its usefulness in gynecology. This is due to the normal drop in the sedimentation rate during pregnancy which becomes confusing when comparing the rate with that in the nonpregnant state. It was in the hope of gaining a definite idea of this normal drop that a series of fifty cases were followed through pregnancy with tests made at regular monthly intervals, over two hundred and fifty determinations in all being made. The patients chosen were those passed on by the internists as being perfectly normal from a physical standpoint. Each sedimentation test was checked by the body temperature and white blood count. A definite curve was secured in each case, the greatest drop being reached by the sixteenth and twentieth week. A normal variation of between twenty and thirty minutes exists between different individuals, but it was striking how uniform the test remained throughout pregnancy in the same individual. An excessively low reading at any time during pregnancy may be taken as an indication of pathology, most valuable of course during the first half of pregnancy, when the normal rate is still relatively high.

ALICE F. MAXWELL, M. D. (University of California Hospital, San Francisco).—For the last three years every patient admitted to the gynecologic service of the University of California Hospital has had a sedimentation test done in addition to the routine clinical and laboratory examinations. In healthy women the blood sedimentation varies from three to four hours. As the result of observation on more than one thousand women, we feel that the repetition of the test and its correlation with the physical findings, temperature, pulse and leukocyte count is of very definite value. In the early weeks of pregnancy the rate of sedimentation is of little or no value in establishing the diagnosis; in general the sedimentation time decreases as pregnancy advances. Before the fifth month of pregnancy, when the diagnosis may rest between a rapidly growing myoma and a pregnancy, the test is of no great aid; after this period no special test is necessary to establish the diagnosis. A rapid sedimentation time in a nonpregnant woman indicates infection, although this infection need not necessarily be confined to the pelvis. A greatly decreased sedimentation time may be expected in all acute inflammatory conditions of the pelvis and in severe toxemias due to absorption of native or foreign proteins. Uncomplicated fibroids (leukocytes normal, fever free) invariably showed a slight increase of speed in sedimentation; degenerated fibroids (in afebrile women with normal leukocyte counts) showed a markedly increased rate. Large nonmalignant ovarian tumors also showed a more rapid sedimentation than the norm; if associated with adhesions or ascites the blood settled even more rapidly. Cervical carcinoma invariably showed a rapid rate; especially in the presence of necrosis or metastasis. Pelvic carcinoma, in general, showed rapid sedimentation. In pelvic inflammation a sedimentation time greater than sixty minutes is evidence against actual pus in the pelvis, one under thirty minutes is invariably found with purulent collections. It has long been recognized that a subacute or latent pelvic infection may be reactivated by surgical procedures, yet in these cases the leukocyte count and temperature curve are often normal. The rapid sedimentation, which is always found with these often unsuspected conditions, is a very delicate and accurate index of the infection, and a most valuable test for the virulence of the infection. The sedimentation test is also of value, from a prognostic point of view, in cases of sepsis, whether puerperal, postabortive, or postoperative. It responds more readily to the virulence of the infection than does the leukocyte or temperature curve, and is a more delicate prognostic index. This simple test is sufficiently dependable to warrant its use in every gynecologic patient.

Doctor Tollefson is to be congratulated on the concise presentation of his work and for the reasonable deductions drawn therefrom and for emphasizing the importance of a simple yet most valuable diagnostic and prognostic laboratory procedure.